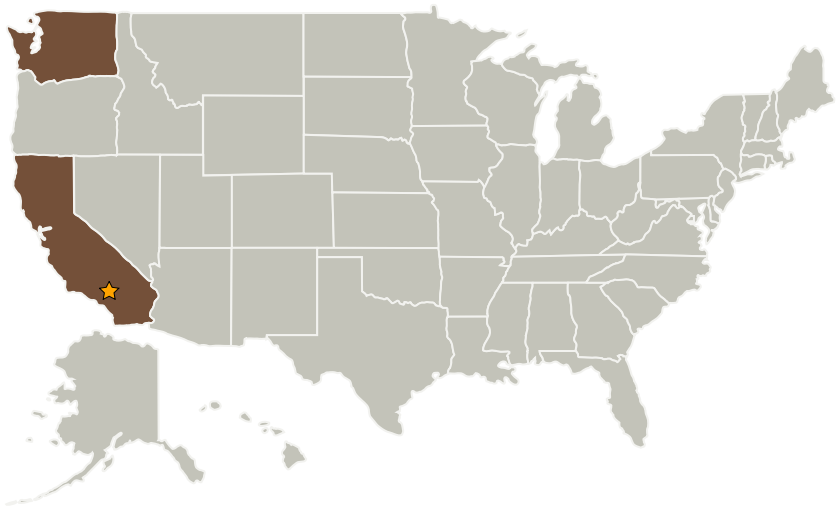
Transonic Stability Test of Variable Drag Ballute, Phase II

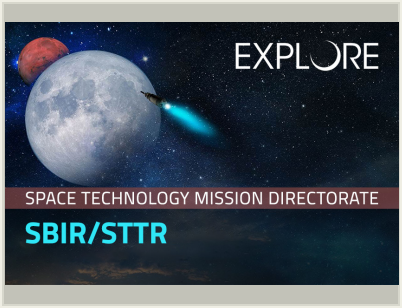
Completed Technology Project (2004 - 2005)

Project Introduction

Ballutes, or inflatable decelerators, offer significant advantages over rigid shells for aerocapture of planetary spacecraft and for earth reentry of cargo by providing mass savings and simplified packaging features. Traditional ballutes, however, have provided little or no trajectory control. For new platform functionality, high drag must be accompanied by some degree of control; also, incorporating thermal protection into the design provides additional weight savings. Ballutes are typically designed to create a low ballistic coefficient, reducing heating rates. However, a low ballistic coefficient also makes them inherently susceptible to insertion trajectory errors, atmospheric density variations, and winds. The use of a variable drag design allows for in-flight adjustment of ballistic coefficient. This significantly lowers downrange dispersions, resulting in a higher reliability recovery system. The specific innovation proposed is the design of a forward-attached, variable drag ballute for atmospheric entry. To demonstrate dispersion control in a forward-mounted ballute, Andrews proposes two flight tests of a subscale, pressure-supported, symmetric ballute that modulates drag by internal pressure control. The experiments are designed to demonstrate the ability to actively vary drag and prove transonic stability while avoiding an aeroheating environment requiring specialized thermal materials.

Primary U.S. Work Locations and Key Partners





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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Armstrong Flight Research Center (AFRC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Armstrong Flight Research Center(AFRC)	Lead Organization	NASA Center	Edwards, California
Andrews Space, Inc.	Supporting Organization	Industry	Tukwila, Washington

Primary U.S. Work Locations	
California	Washington

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX09 Entry, Descent, and Landing
  - TX09.2 Descent
    - TX09.2.1 Aerodynamic Decelerators